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(54) LOCKING DEVICE FOR THE INPUT OPENING FOR COINS OR CHIPS IN COIN OPERATED APPARATUS

(71) We, KIENZLE APPARATE G.m.b.H., a German Body Corporate of Villingen-Schwenningen, Black Forest, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a locking device for the input opening for the coins or chips to actuate coin operated apparatus such as parking meters, the input opening being preferably in the form of a slot through which the coins or chips may be put in to release an operating cycle.

Coin operated devices of this kind wherein by the insertion of a coin or a chip representing a certain value a selling process is released require a considerable amount of fraud protection. When such coin operated apparatus are set up in great numbers in public places, as this is the case for parking meters for instance, much skill and imagination is spent in trying to fraudulently influence such apparatus. Since by means of a parking meter no goods are being sold, but the user only acquires the right to use a parking space for a predetermined time it is just sufficient to disturb the function of the device in a certain way by some kind of manipulation. This can simply be effected by putting in certain objects through the input opening so that at least part of the operations of the apparatus are released when a certain skill is applied. Mostly, however, the apparatus are blocked against further operation or even certain parts thereof are destroyed.

A locking device for the input slots of parking meters has become known from the French patent 1,592,485. In this known device a shutter is arranged in the coin guide way which shutter is tiltably mounted under the action of springs on one stationary shaft and on a second shaft rotatably mounted transverse to the side walls of the coin guide way, the two shafts being connected to each other via a connecting rod. The shutter cooperates with an arresting part which is moved out of the way when a coin is inserted. In the known device the only arresting part may be easily operated from outside by means of any flat object so that when it has been operated the shutter opens the coin guide way to the insertion of any object of corresponding thickness. This sort of simple security device is not sufficient protection against being manipulated with fraudulent objects as compared with the great variety of ways and means available to release or disturb the functioning of the apparatus. Since the shutter is arranged in the coin guide way and is tilted in the direction of coin insertion this locking device takes up considerable space in the interior of the apparatus which can only be compensated by a corresponding shape of the housing and of the functional parts contained therein.

The present invention may avoid the disadvantages of the known devices. According to the invention the locking arrangement shall be of compact design serving to completely cover and safely lock the input opening of coin operated apparatus of the known kind so that there is multiple security against fraudulent objects being put into the device.

According to the invention the locking device for the input opening consists of a pair of segments rotatably arranged to block the coin input path and of at least two slidably arranged sensing elements which protrude into the coin input path, the sensing elements being in operative connection with the segments and having means for controlling the rotation of the segments which allow for the release of the locking device only when operated by the action of a coin or chip of suitable thickness simultaneously over sensing portions on the sensing elements so that the segments are moved to a certain opening angle.

Further preferable features of the invention may be taken from the appended claims.

The device according to the invention consists of only a few simple parts and may

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be mounted as a separate unit independently of the other operational functions as a shutter for coin-operated apparatus. It is of a very flat construction in the direction of the coin movement and may therefore be arranged on a very small space between the input opening and the functional parts of the apparatus. This advantage is due to the fact that all functional movements of the sensing and locking elements as well as of the segments are performed in a plane which is transverse to the coin input movement. A coin mask has an input opening for a coin of a predetermined size, a coin guiding surface and a bracket for mounting guide members for the segments and the sensing elements. At least two sensing elements are arranged behind the input opening and protrude to a certain extent into the coin guide way. When a coin is tested between the guide surface and the sensing elements the sensing elements are independently actuatable in accordance with the thickness of the coin and therefore also independently of each other unlock the segments and drive them to a certain opening angle.

Only when the two sensing elements are simultaneously operated by a coin of suitable dimension can the segments be moved to open the input slot. Owing to a toothing the segments are in positive driving connection with each other and can therefore only be moved synchronously to let a coin pass. This is of special advantage in so far as, as long as only one sensing element is operated, both segments remain in their locked position. To definitely close the input opening the segments are of such shape that they overlap each other when they are moved to the locking position.

An advantageous embodiment of the invention is shown in the drawings and described, by way of example, in the following:

Fig. 1 is a representation of the device in locked position.

Fig. 2 shows the device in a partially opened position when a coin passes (out of the plane of the drawing).

Fig. 3 is a section of the device in its locking position a coin being shown on the coin guide plane.

Fig. 4 is a section similar to Fig. 3 with a coin just passing the coin mask.

An advantageous embodiment of the locking device for the coin input opening 6 consists essentially of a coin mask 1, several movable coin sensing elements 2, 3 and segments 4, 5 which may be driven and arrested to lock the input opening 6. The coin mask 1 is made in one piece having a guide slot 7 dimensioned in accordance with the size of the coins to be used (Fig. 2). One longitudinal edge of the guide slot 7 is in the form of a coin guiding surface 8 which serves to support the coin before it enters the coin mask 1 (Fig. 3). Extending vertically to the coin guide slot 7 there are cut-outs 10, 11, 12 and 13 serving to guide the movable sensing elements 2 and 3. Turned-over lugs 14, 15 (Figs. 1, 3 and 4) serve to enlarge the coin mask adjacent the cut-outs 11 and 13 and prevent a tilting movement of the sensing elements 2 and 3. Adjacent the coin guide slot 7 the coin mask 1 is provided with portions 16 and 17 bent-over at an angle of 180° and leaving slots 18, 19 only slightly wider than the strength of the material of the segments 4 and 5, which slots 18 and 19 guide and support the free ends of the segments 4 and 5 against lateral pressure. Symmetrically to the median line of the guide slot 7 there are blots 20 and 21 arranged on the coin mask 1 which are opposite the slots 18 and 19. Each bolt 20 and 21 serves to mount one of the segments 4 and 5 to rotate transversely to the input direction of the coins. An arm 22 is arranged at right angles to the coin mask 1 and serves to mount a spring 23 actuating both sensing elements 2 and 3 so that by means of its two shanks 24, 25 the two sensing elements are simultaneously movable in one direction independently of each other. Serving as a bearing element for the whole device the coin mask 1 is provided with lugs 26, 27 serving to mount the locking device in a correspondingly shaped housing part of the device in which it is to be applied. In the special embodiment the device shall be used in the interior housing of a coin operated apparatus in connection with a coin guide slot, not specifically shown, so that the coin mask 1 may be fastened in correct position through the turned-over lugs 28, 29 by means of screw connections.

The segments 4 and 5 are rotatably mounted like shears on bearing bolts 20 and 21 and have toothed segments 30 and 31 concentrically to their bearing point and in engagement with each other. Diametrically opposite the point of engagement there are lever arms 32 and 33 each serving as driving parts for driving the segments to their opening positions through the sensing elements 2 and 3. The opening movement of the segments 4 and 5 is counteracted by a spring 34 mounted to turned-over lugs 35 and 36 which spring acts on the segments 4 and 5 to move them shearlike to the locked position. The segments 4 and 5 have locking surfaces 38 and 39 to cover the guide slot 7. Extending beyond the edge of locking surface 38 there is an extension 37 turned away as much as the strength of the material so that the slot between the two segments 4 and 5 in their locked position is covered. The locking surfaces 38 and 29 are circular shaped and extend beyond the coin guide slot 7 so that they move in the slots 18

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and 19 adjacent the coin guide slot 7 and are guided against any lateral pressure. Both segments 4 and 5 have cut-out portions 40 and 41 on their interior edge by means of which they cooperate with spring actuated locking parts 42, 43 in th elocked position of the segments thereby blocking any regular movement of segments 4 and 5.

On that side of the coin mask 1 turned towards the user the sensing elements 2 and 3 are in the form of slides 2^1, 3^1 movable in vertical direction to the plane of the coin, each slide having several sensing surfaces 44, 45, 46. The sensing surfaces 44, 45 and 46 are in three planes sloping to each other and in cooperation with the surface of the coin 9 have to fulfill various functions. The plane of the sensing surface 44 slopes with respect to the coin input direction so that the force exerted by the coin in its input direction can be divided into several components. That part of the force acting vertically to the coin input direction drives the slides 2^1 and 3^1 against the action of the spring 23 since the coin is otherwise supported by the coin guiding surface 8. The extent of the sliding movement is dependent on the thickness of the coin 9 and the length of the effective part of the sensing surface 44. The sensing surface 45 is essentially parallel to the plane of the coin guide surface 8 and to the coin 9 to be put-in (Fig. 3 and 4). It serves to sense the coin surface and retains the slides 2^1 respectively 3^1 in their upper position as long as the coin 9 is within the input opening 6 between the coin guide surface and the sensing elements 2 and 3. With a sharp edge and at an angle of less than 90° the sensing surface 46 is connected to the surface 45. Since each coin owing to the coining process has recesses, the spring actuated slides 2^1 and 3^1 move independently of each other down to the coining recesses whilst the coin 9 moves through the coin mask 1, so that any movement of the coin 9 contrary to the input direction is thereby prevented.

Each slide 2^1 and 3^1 has two laterally extending arms 47, 48 respectively 47^1, 48^1 which are guided by the cut-outs 10 to 13 of the coin mask 1 thereby exactly guiding the sensing elements 2 and 3. Simultaneously the arms 47, 48 respectively 47^1, 48^1 cooperate with the segments 4 and 5 in such way that one arm 47, 47^1 serves as arresting element 42, 43 to lock the segments 4 and by cooperation with their cut-out portions 40 and 41. The other arms 48 and 48^1 which are hook-shaped cooperate with the arms 32 and 33 of segments 4 and 5. The distance between the locking edge on arms 47, 47^1 and the engaging edge on arms 48, 48^1 corresponds to the distance of parts 40, 41 and 32, 33 on the segments 4, 5 in such a way that locking of the segments 4 and 5 by means of their cut-out portions 40, 41 is released before the segments are driven to the opening position via lever arms 32, 33. An increased degree of safety against an unwanted opening of the segments 4 and 5 is obtained by the fact that both segments must be unlocked before they can be rotated. Since the toothed segments 30 and 31 are in permanent engagement both segments remain blocked as long as only one sensing element has been moved to the unlocked position. For a still better protection against unwanted manipulations it is therefore possible to increase the number of sensing elements with respect to their locking function.

When the spring actuated locking parts 42 and 43 of sensing elements 2 and 3 are in the cut-outs 40 and 41 they are in their initial position. In this position the sensing surfaces 44 and 45 have a defined distance from the coin guide surface 8, a distance which prevents an opening of the input slot by means of thin objects as compared with the coin thickness.

The device functions in the following manner:

The device for locking the input opening for coins or chips in coin operated apparatus is provided to be arranged immediately on the housing wall behind the input opening. To be universally applicable it is of a very flat, space saving construction in order to be arranged at the entrance of the coin guide way. Usually the housings are shaped like a funnel near the coin input slots so that the user can easily perceive them. When put in, the coin 9 is led to the coin mask 1 above the plane of which the sensing elements 2 and 3 protrudes in accordance with the device already described. In input direction the coin 9 at first slides along the sensing surface 44 and is then supported by the coin guide surface 8. Owing to its thickness and its circular shape it is centered between the sensing elements 2 and 3 and before entering the coin mask 1 drives the sensing elements vertically to the coin input movement against the action of the spring 23. Over the first part of their movement the sensing elements 2 and 3 unlock the segments 4 and 5 since their arms 47, 47^1 are moved out of the cut-outs 40 and 41. During the rest of the movement of the slides 2^1, 3^1 the arms 48, 48^1 drive the segments 4 and 5 to a predetermined opening angle. The coin 9 can now pass the coin mask 1 between the coin guide surface 8 and the sensing surfaces 45 and owing to its circular shape it directly cooperates with the edge of the locking surfaces 38 and 39. During its movement the coin 9 acts as a wedge and drives the segments 4 and 5 which follow the circumference of the coin by a shearing movement to an opening angle correspond-

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ing to the diameter of the coin. While the coin 9 passes the coin mask 1 the sensing elements 2 and 3 move down into the coining recesses and prevent a retraction of the coin 9 by hooking in the convex portions of the coin surfaces, especially in the interior part of the coin rim.

The segments 4 and 5 follow continuously sliding along the circumference of the coin owing to the force of the spring 34 acting in locking direction. The guide slot 7 in each part of the movement is only opened so much as is determined by the direct contact between the coin 9 and the segments 4 and 5. When the coin 9 has passed beyond the climax the spring operated segments accelerate the input movement of the coin 9 due to the spring driven segments 4 and 5. The sensing elements 2 and 3 are moved into the interior edge of the locking surfaces 38 and 39 and when the segments 4 and 5 have been completely closed again lock them by cooperation between the arms 47 respectively 47^1 and the cut-outs 40 and 41.

WHAT WE CLAIM IS:—

1. A device for locking the input opening for coins or chips in coin operated apparatus, wherein the input opening is a slot through which the coin or chip may be put in to release an operating cycle, the device consisting of a pair of segments rotatably arranged to block the coin input path and of at least two slidably arranged sensing elements which protrude into the coin input path, the sensing elements being in operative connection with the segments and having means for controlling the rotation of the segments allowing for the release of the locking device only when operated by the action of a coin or chip of suitable thickness simultaneously over sensing portions on the sensing elements so that the segments are moved to a certain opening angle.

2. A device according to claim 1, wherein the device is provided with a coin mask having a coin guide slot corresponding in size to the diameter and the thickness of the coin to be used, one longitudinal edge thereof being shaped as a coin guide surface for guiding the coin before entering the coin mask.

3. A device according to claim 2 wherein the segments are mounted for rotation transverse to the coin input direction on separate mounting bolts on the coin mask.

4. A device according to claims 1 and 3, wherein the segments have concentrically to their bearing point toothed segments which are in engagement with each other and by means of which they are moved mutually dependent of each other by the same angular distance.

5. A device according to claims 1, 3 and 4, wherein the segments are under the action of a common spring which tends to move them to the locking position.

6. A device according to claim 1, wherein one segment has an extension bent out of the segment plane by an amount equal to the segment thickness and serving to cover the locking edges of the segments over at least the range of the coin guide slot and covering the slot between the segments in the locking position.

7. A device according to claims 1, 3, 4, 5 and 6, wherein the segments have cut-outs cooperating with spring actuated locking means in the locking positions of the segments.

8. A device according to claims 1 and 3 to 7, wherein each segment has a lever arm serving as driving means for driving the segments in accordance with the thickness of the coin sensed by the sensing elements.

9. A device according to claims 1 and 2, wherein lugs turned over by 180° are provided on the coin mask adjacent the coin guide slot for guiding and supporting the segments against lateral pressure.

10. A device according to claims 1, 2 and 9 wherein the coin mask has cut-outs for guiding the sensing elements.

11. A device according to claim 1, wherein the sensing elements are in the form of slides movable perpendicularly with respect to the coin guide plane and having sensing surfaces.

12. A device according to claims 1 and 11, wherein a spring is mounted on the coin mask which by means of its two shanks simultaneously and independently urges the two slides in sensing direction against an inserted coin.

13. A device according to claims 1, 11 and 12, wherein the sensing elements have sensing surfaces arranged in three planes sloping to each other and having different operational functions.

14. A device according to claims 1, 7, 8 and 10 to 13, wherein each slide has two laterally extending arms serving on the one hand to guide the slides in the coin mask, on the other hand cooperating with the corresponding segments in such manner that one arm serves as locking means to lock the segments in their cut-outs while in the opposite direction of movement the other arm drives the segments to a certain opening angle after unlocking.

15. A device according to claims 1, 11, 12 and 13, wherein the sensing surface slopes with respect to the input direction of the coin in such manner that a genuine coin exerts a driving force on the slide over the sensing surface perpendicularly with respect to the coin moving direction.

16. A device according to claims 1, 11, 12 and 13, wherein one sensing surface is a surface lying essential parallel to the coin

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input direction and arranged in the same plane in which the coin passes the coin mask such sensing surface forming an acute angle with another sensing surface so that the slide enters the coining recessions of the coin when the coin passes the coin mask thereby preventing a retraction of the coin.

17. A device according to claim 1, 3, 5 and 6, wherein when the passing coin has been sensed as to its thickness between a coin guiding surface and the sensing surfaces, the circular edge of the coin is in direct contact with the locking edges of the segments thereby effecting the opening and closing of the segments by a sliding movement between the locking edges on the coin circumference.

18. A device according to claims 1, 3, 5 and 6, wherein the spring driven segments, by cooperation between the locking edges and the circumference of the coin, accelerate the coin in input direction after the coin has passed the coin mask by more than half its area.

19. A device substantially as described herein with reference to and as illustrated by the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig. 1

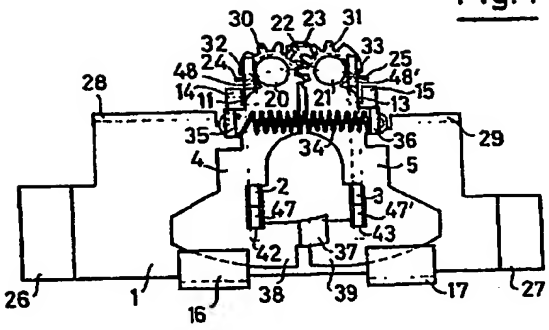
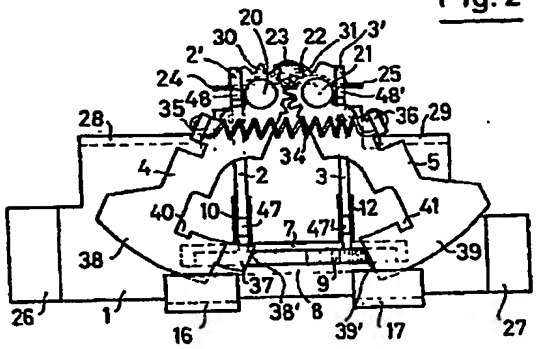


Fig. 2



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1444735 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

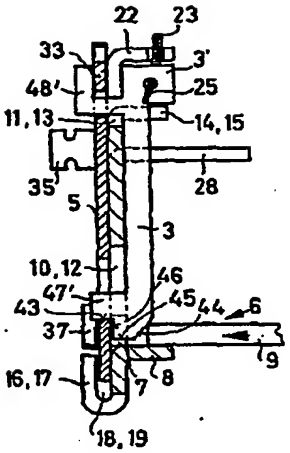

Fig. 3

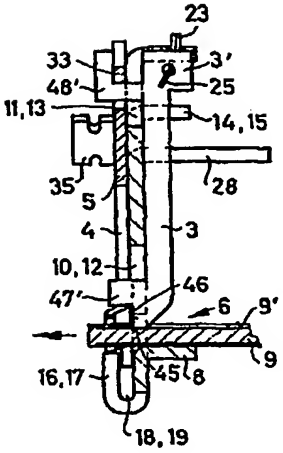

Fig. 4

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